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oral cleft rectilinear; *teeth* of the upper jaw minute; of the lower, in front, enlarged, but unequal, elongated, recurved and acute; behind minute; at the symphysis directed forwards; small, acute and hooked, and in a double row on the tongue; palate smooth; caudal very small, convex; pectorals inserted very low, linear, of few rays closely connected; ventrals scarcely behind the middle, with about six rays, the external (except the outermost) of which are produced. Intestine with a flexure.

Type.—*Malacosteus niger*, Ayres.

"The principal points on which" Mr. Ayres would "particularly insist, as characteristic of the species and the genus, are the remarkable small size of the head, and, in contrast with this, the immense development of the whole facial and branchial apparatus, and all that pertains to the mouth and throat, the singular and but partially explained organ on the cheek; and, most of all, the embryonic condition of the entire osseous system." In all respects—perhaps even the last—the genus resembles *Stomias*. Sir John Richardson has suggested that the want of ossification may be due to the preservation of the fish in weak alcohol, but I am scarcely disposed to accept that hypothesis, and would even believe that *Stomias* itself may be found to have an imperfectly ossified skeleton, but not, perhaps, in so marked degree as *Malacosteus*.

In the consideration of the faunistic anomalies here enumerated, we may be aided in a solution of the causes by the consideration of nearly similar peculiarities in the Ichthyology of the Scandinavian seas. There alone in the more northern seas, species of the genera *Beryx* and *Batrachus*, closely allied to or undistinguishable from Mediterranean or tropical species, are found, and there also has been discovered *Pterycombus*, a genus whose affinities are with the tropical *Pteraclides*. No representatives are found at intermediate places along the European coasts. Again, along the Rhode Island and neighboring coasts have already been found *Sarothrodus*, *Priacanthus*, and *Hyporthodus*, the last closely related to *Serranus*. All the places enumerated are near the borders of the Gulf Stream. How far the distribution of these genera is thereby affected it is not my intention to now discuss, my desire being simply to draw attention to the facts. Further details regarding their *bathymetrical*, as well as geographical, distribution are desirable.

Synopsis of the CYCLOPTEROIDS of Eastern North America.

BY THEODORE GILL.

The description of a new species of *Liparis*, from the Arctic seas, is here submitted, and attention is called to some points in the synonymy of other species of the genus which require elucidation. To complete a view of the family to which they belong, I enumerate the Cyclopterinæ. The family is restricted, with Günther, to those fishes whose sucltorial disk is formed by the union of the ventral fins, and which have numerous pyloric cæca, as it is not evident that there is any close relation between such and the *Gobiesocoids*.

CYCLOPTERINÆ, Bon.

CYCLOPTEROIDS with a ventricose body and two dorsal fins, the first of which is small, and composed of spines; the second, as well as anal, short, and obliquely opposed to each other; and with the caudal vertebrae in scarcely increased number, (Vert. 12+16 pm.)

Genus CYCLOPTERUS, L.

Lumpus, Cuv.

CYCLOPTERINÆ with dorsal region elevated in front, larger plates disposed in an unpaired dorsal row and two lateral and one abdominal on each side; the eyes small and anterior; the branchial apertures just above the pectoral fins; the spinous dorsal almost concealed, and the ventral disk small.

1864.]

CYCLOPTERUS LUMPUS, L.

Cyclopterus minutus, *Pall.* (Young).

Cyclopterus caruleus, *Mitch.* (New York).

Lumpus vulgaris, *Storer.*

Lumpus anglorum, *Dekay.*

Hab.—Greenland to New York.

Is the American *Cyclopterus* identical with the European? The latter has not been examined by myself.

Genus EUMICROTREMUS, Gill.

CYCLOPTERINÆ with the back gibbous; the large plates less regularly disposed, and obsolete on abdomen; the eyes large and submedian; the branchial apertures elevated, and behind the ocular region; the spinous dorsal well developed, provided with 6 or 7 spines; and the ventral disk large.

EUMICROTREMUS SPINOSUS, Gill.

Cyclopterus spinosus, *Fab.* et al.

Hab.—Greenland.

Subfamily LIPARIDINÆ.

Liparinæ *Gill* Cat.

Liparidina *Gthr.* Cat. iii.

Cyclopteroids with an elongated body, and long, uninterrupted dorsal and anal fins, the anterior rays of which, especially of the dorsal, are spinous, and with caudal vertebræ in greatly increased number, (Vert. 10—12+25—50.

Genus LIPARIS, (Art.) Linn.

Cyclogaster Gron.

LIPARIDINÆ with a nearly or quite horizontal oral cleft; longer upper jaw; pluriserial tricuspid teeth; a well developed ventral disk on the breast, below or partially behind the posterior half of the head; the anus little in advance of the anterior third of the length, and the origin of the anal fin not far behind it.

Type.—*Cyclopterus liparis* L.

This genus, even after the elimination of the *L. tunicata* of Kroyer, exhibits considerable variation, especially in the relations of the dorsal and anal fins to the caudal, these fins being, in some species, completely isolated, while in others they are coalescent, and united in an almost anguilliform posterior fin. In the latter, the nostrils also appear to be simple, while in the former the posterior ones are tubular. These differences appear still further to be coincident with a disparity in the number of caudal vertebræ, and of the rays of the vertical fins. Nevertheless, it is not deemed advisable to generically separate the types so distinguished.

But the differences between the *Liparis tunicata* of Kroyer, (*Tidskrift*, ser. 3, B. i., 236), and the typical *Liparides*, appear to indicate a more decided demarcation, and the morphological differences mentioned in the analytical table are apparently coincident with difference in size; it is, therefore, probable that the species is the type of a distinct genus, for which the name of *Actinochir* would be appropriate. For the present, however, it is retained in the genus *Liparis*.

The increase of our knowledge of the Greenland Liparidina, since the publication of the "Catalogue of the Fishes of the Eastern Coast," is chiefly due to Dr. Kroyer, who, appreciating the imperfection of our information, has favored us with a monograph of those species. This has chiefly served as the basis of the present article.

I omit, for the present, references to the *Liparides* of the British northern travellers.

[Sept.

Synopsis.

- I. P. 28—35. Anterior nostrils simple. D. 12—15+ A. 2. 24—33.
 * D. and A. connate with C. Posterior nostrils tubular or subtubular.
 D. 13+21.* A. 2+29. C. 13. P. 34. Coloration in longitudinal lines..... *lineata*.
 D. 12+30. A. 2+32. C. 11. P. 35. Color uniform reddish-brown..... *arctica*.
 D. 13+27. A. 2+30. C. 9. P. 34. Color dirty yellow, with darker blotches. (Nostrils scarcely tubular)..... Fabricii.
 ** D. and A. disconnected with C. Posterior nostrils simple.
 D. 13+16—17. A. 24—25.† C. 18. P. 29—30..... Montagui.
 II. P. 42 pm. Anterior nostrils tubular; (posterior, simple). D. 21+24. A. 7+31. C. 10 pm. D. and A. connate with C. near base. major.

LIPARIS LINEATA, Kroyer.

- Liparis lineata*, Kroyer, Naturhistorisk Tidsskrift, ser. 2, b. ii., p. 284. 1847.
 “ “ Kroyer, Voyage en Scandinavie, &c., tab. 13, fig. 2, a—g.
 “ “ Lütken, Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjöbenhavn, 1860, pp. 169—174.
 “ “ Kroyer, Naturhistorisk Tidsskrift, ser. 3, B. i., pp. 244—251.
 “ “ Lütken, op. cit., 1861, pp. 243—265, pl. 7, fig. 1.
 “ “ Kroyer, op. cit., ser. 3, B. i., pp. 539—553.

In the synonymy of *Liparis lineata*, I have only included the references to the Greenland fish, without, by any means, undertaking to decide between Drs. Kroyer and Lütken, the former of whom considers the Greenland fish entirely distinct from the *Cyclopterus lineatus* of Lepechin, while the latter considers it the same, and also identical with the *Liparis vulgaris* of Europe, but still retains the name *Liparis lineata*, as Lepechin first gave the distinctive appellation. As, therefore, the nomenclature is not affected, Dr. Kroyer retaining the name *Liparis lineata* for the Greenland fish, I am glad to be able to leave the controversy in *statu quo*.

The discrepancies between the radial formula, especially of the caudal fin, of *Liparis vulgaris* of authors and *Liparis lineata* deserves attention. Thus Günther assigns to his *Liparis vulgaris* D. 35—36, A. 27—28, C. 10; Lepechin, to his *Cyclopterus lineatus*, D. 36, P. 26, A. 28, C. 13?; Kroyer, to his *Liparis lineatus*, D. 13+21, A. 2+29, C. 13, P. 34; and Lütken, to his, D. 36, A. 30, C. 14? P. 33, and with the results of the latter two my own observations agree.

Of thirteen English specimens of the so-called *Liparis vulgaris* of Yarrell, eleven exhibited little distinct coloration on the body, but the dorsal and anal fins were densely dotted, so as to give to those fins, especially when folded, a blackish-blue hue. The pectorals of some, especially towards the superior margin, were also clouded. In one specimen, the head and body were distinctly marmorated, and delineations like those represented on the head, body and pectorals of *Liparis lineatus* by Kroyer, and *L. lineata* by Lütken, were observed, but the dorsal and anal were simply dotted as in the ordinary variety, and the delineations themselves were dark lilac on a yellowish ground. The last one, consequently, represented the *L. lineatus* of Lepechin and Lütken, and the others the *L. barbatus* of Ekstrom and Lütken.

LIPARIS ARCTICA, Gill.

The greatest height exceeds a third of the total length, while the greatest width is rather less than a seventh; the height at the end of the caudal pe-

* The formula D. 19+21 appears to have been given through inadvertence, in the Tidsskrift, ser. 3, i., 244.

† A. 2. 22, Kroyer, Nat. Tid. ser. 3, i., 548; A. 4. 20—2. Kroyer, ib i., 273.

duncle equals about a fourth of the length of the caudal fin. The head, from the snout to the margin of the auriform projection, almost or quite equals a fourth of the length, while its breadth enters nearly $6\frac{1}{2}$ times in the same, and is little greater than the height; the forehead is depressed, and the snout moderately high and decurved. The eyes are just within the anterior half of the head; the width of the forehead between them equals a third of the head's length. The anterior nostrils are simple; the posterior tubular. The dorsal and anal are connate with the caudal; the former united for about a fourth of the length of the caudal, the latter two-fifths. The caudal is convex behind, and forms a seventh of the length. The pectoral enters about $5\frac{1}{2}$ times in the length, and the ventral disk ten times.

D. XII. 30. A. II. 32. C. 11. P. 27+8.

The color is uniform reddish-brown or dark chesnut, without spots or bands.

This species, in general form as well as color, resembles the *L. Montagu*, but is in other respects widely different. Its relations to the other Greenland species is exhibited in the analytical synopsis; it is well distinguished by its rusty color.

Specimens were obtained by the Arctic navigator, Dr. Hayes, at Port Foulke, Greenland, and are preserved in the Academy of Natural Sciences of Philadelphia, and the Smithsonian Institution. In the Museum of the latter, there is only a single specimen.

LIPARIS FABRICII.

Doubtful Synonymy.

Cyclopterus liparis, altera minor, *Abopokitsok*, *Fab.*, *Fauna Grœnlandica*, p. 135, 1780.

Cyclopterus liparis, minor *Walbaum* in *Arteâi*, *Genera Piscium*, p. 489, 1792.

Cyclopterus liparis, a *Bonnaterre*, *Tableau Encyclopedique et Methodique.—Ichthyologie*, p. 28, 1788.

Liparis tunicata, pp. *Reinhardt*, *Oversigt orer det kongelige Danske Videnskabernes Selskabs Forbandlinger* vi., p. cxi., (*tr.* *Archiv für Naturgeschichte*, Jahrg. iii., B. i., p. 267, 1836).

Vix liparis tunicatus Reinhardt, *op. cit.*, p. 78. (*Isis von Oken*, 1844, 819), 1842.

Determined Synonymy.

Liparis Fabricii Kroyer, *Naturhistorisk Tidsskrift*, ser. 2, B. ii., p. 274, 1847.

Liparis Fabricii, pp. *Reinhardt*, in *Naturhistoriske Bidrag til en Beskrivelse of Grønland*, 1857.

Liparis Fabricii, pp. *Gill*, *Catalogue of the Fishes of the Eastern Coast*, p. 47.

Liparis tunicatus, (*Fabricii*, *Kr.*) *Lütken* *Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjöbenhavn*, 1860, p. 173.

Liparis Fabricii Kroyer, *Naturhistorisk Tidsskrift*, ser. 3, B. i., p. 235, 1862.

Liparis Fabricii Günther, *Catalogue of the Fishes, &c.*, iii., 161, 1861.

Fabricius, in the *Fauna Grœnlandica*, refers to the *Cyclopterus liparis* of *Linnaeus*, two forms of *Liparis* found by him in Greenland. To the first variety—"1) Altera minor, *Abopokitsok*"—were attributed 39 dorsal, 33 anal, 30 pectoral, and 14 caudal rays; 4 tubular nostrils; a union of the dorsal and anal fins with the caudal, which latter is nearly cuneate, and a fuscous color; the jaws externally, the inferior ocular region and the opercula have rather indistinct white dots, and the tips of the upper pectoral rays being likewise white. This combination does not entirely agree with any of the Greenland species, as described by *Kroyer*, but most approximates to the *L. Fabricii*; from that species the number of caudal rays, (14) if correctly stated, would separate it, and the color is also, perhaps, inconsistent. I am fain, then, to leave the identity of this species in doubt, trusting that future material may enable us to arrive at a certain decision.

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In 1835 or 1836, Reinhardt offered to the Danish Academy a Contribution on new Greenland Fishes, closing this contribution with the remark that "there also exists in the Greenland seas the *Cyclopterus liparis*, Fab., which is named *Liparis tunicata*, on account of the peculiar loose adherence of the skin, and which, in its characters, has much similarity with the European species illustrated by Yarrell, in his *British Fishes*; but, as the Museum had in its possession only one badly preserved specimen, no certain identification could be made."*

The name *L. tunicata* is thus solely based on the *C. liparis* of Fabricius, and as the first variety is the one fully described by that author, and consequently the type of his species, and, as Reinhardt's remarks on the similarity of the species to the European are only correct for that variety, the name *L. tunicata* must be connected with it.

But, in a subsequent communication on "*Liparis glutinosus*," Reinhardt's ambiguous language might lead one to suppose that he connected the name *L. tunicatus* with only the large variety of *Cyclopterus liparis* of Fabricius, he remarking that "Fabricius considered that the large Greenland species, the *Liparis tunicatus* (sic.) of the Museum, might well be the Stellerian *L. glutinosus*." However this may be, the name proposed by Reinhardt must be accepted with its first limitation, and share with the variety of Fabricius the doubts concerning its proper application.

The name *Liparis Fabricii* was subsequently proposed by Kroyer for the species under consideration, and being the first known to be applicable to it, is provisionally accepted.

The radial formula given by Günther differs considerably from that assigned by Kroyer, (B. 5, D. 42, A. 33—35, C. 12, Gthr.) and approximates to that of Fabricius, especially in the number of caudal rays.

LIPARIS MONTAGUI, Don.

Liparis Montagui Kroyer, Voyage en Scandinavie, &c., tab. 13, p. 1, a—f.

Liparis Montagui Kroyer, Naturhistorisk Tidsskrift, ser. 3, B. i., p. 243.

Only the references to the Greenland form have been given. It may be remarked that while Kroyer, both in his Denmark's Fiske, (ii., 519) and the Naturhistorisk Tidsskrift, has assigned 18 caudal rays to this species, Yarrell, Nilsson and Günther have only attributed to it 13 or 14. There are also some slight discrepancies between the proportions assigned to the species by different authors.

LIPARIS MAJOR, Gill.

Cyclopterus liparis, 2, Altera major, *Amersulak-Fabricius*, Fauna Grœnlandica, p. 136, 1780.

Cyclopterus liparis, major, *Walbaum*, Artedi Genera Piscium, p. 489, 1792.

Cyclopterus liparis, B. *Bonnaterre*, Tableau Encyclopedique et Methodique *Ichthyologie*, p. 28, 1788.

Liparis tunicatus, pp. *Reinhardt*, Oversigt over det Kongelige Danske Videnskabsnernes Selskabs Forbundlingar, 1835—6, p. vi., p. cxi.

Liparis tunicata, Kroyer, Naturhistorisk Tidsskrift, ser. 3, B. i., p. 236, 1862.

This species appears to be the second variety of Fabricius' *Cyclopterus liparis*, to which were attributed a much larger size, (long. 10 unc. et lat. 4 unc.) and the formula D. 44, P. 40, V. 8, A. 35, C. 14. Subsequently, it was fully described by Kroyer, under the name *Liparis tunicata*, originally based, by

* "Endelig sluttedes dette Bidrag med den Bemærkning, at der gives i det grønlandske Hav foruden *Fabricii Cyclopterus liparis*, som man kunde kalde *Liparis tunicata* formedelst Hudens særdeles løse Vedhæng, endnu en anden Art, der i sin Tegning har megen Lighed med den af Yarrell i hans *british fishes* aftegnede europæiske Art, men da Museet kun er i Besiddelse af et eneste ikke fuldstændigt Exemplar kan en sikker Bestemmelse endnu ikke finde Sted."

Reinhardt, on the *Cyclopterus liparis* of Fabricius as a whole. Fabricius having only fully described his first variety, it appears advisable for that reason, as well as on account of its precedence, to identify the name with that one. The name given to the present species as a variety, by Walbaum, may, in that case, be accepted as its specific appellation.

Genus CAREPROCTUS, Kroyer.

LIPARIDINÆ with the oral cleft oblique, the lower jaw advanced; teeth simple and hooked; a rudimentary suctorial disk situated far forwards, under the anterior part of the eye, and little distant from it the anus, far behind which is the anal fin.

Type.—*Liparis Reinhardi* Kr.—*L. gelatinosus* R.

This very distinct genus is especially distinguished from *Liparis* by the characters mentioned in the generic diagnosis. We owe its establishment to Dr. Kroyer, its species having been previously confounded with *Liparis*. There are probably two species, one found in Kamtschatka, and the other, long confounded with it, a native of the Greenland waters.

CAREPROCTUS REINHARDI, Kr.

Liparis gelatinosus, Reinhardt, Oversigt over det Kongelige Danske Videnskaberne Selskabs Forhandlingar, 1844—5, pl. x., p. lxxvii., tr. Isis von. Oken, 1844, p. 819.

Liparis gelatinosus, Gill, Cat. p. 47.

Liparis Reinhardi, Kroyer, Naturhistorisk Tidsskrift, ser. 3, Bd I., p. 252.

Careproctus Reinhardi, Kroyer, op. cit. i., p. 257.

Synopsis of the PLEURONECTOIDS of California and North-western America.

BY THEODORE GILL.

In conformity with a promise some time since made,* I now offer a Synopsis of the Pleuronectoids of California, and add descriptions of a new species, which is at the same time the type of a distinct genus, contained in a collection made by Dr. Cooper, of the Geological Survey of California, and kindly submitted to me for examination.

One of the genera admitted—*Uropsetta*—is known to me only through the description and outline figure of its type published by Dr. Ayres. That species was originally described as *Hippoglossus californicus*, but as it evidently did not belong to *Hippoglossus*, it was withdrawn by me from that genus, and taken as the type of a peculiar one. It has since been referred to the genus *Pseudorhombus* by Günther, but the Californian naturalist, in approximating it to *Hippoglossus*, appears to have interpreted nature more truly than the English one. *Uropsetta*, indeed, is apparently more closely related to *Reinhardtius* than to any other.

Four other species are only known through descriptions that are not sufficient to positively decide their true affinities. One is the *Platessa bilineata* of Ayres;† of this the "mouth, of moderate dimensions, the tip of the upper maxillary scarcely reaching the plane of the pupil of the lower eye;" the "single, even row of strong, blunt, conical teeth;" the dextral eyes; the "scales larger and more conspicuous than in any other fish of this tribe yet found on our coast;" and the recurrent lateral line appears to indicate that it is allied to *Lepidopsetta*; but the statement that "the scales of the anterior portion of the body are nearly smooth; further back they become gradually more and more

* Proc. Ac. N. S., Phila., 1862.

† Ayres, Proc. Cal. Ac. i. 40.